Product Specification

QND120N02AJ

20V N-Channel MOSFET

Description

- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge

FEATURES

- 20V, 90A

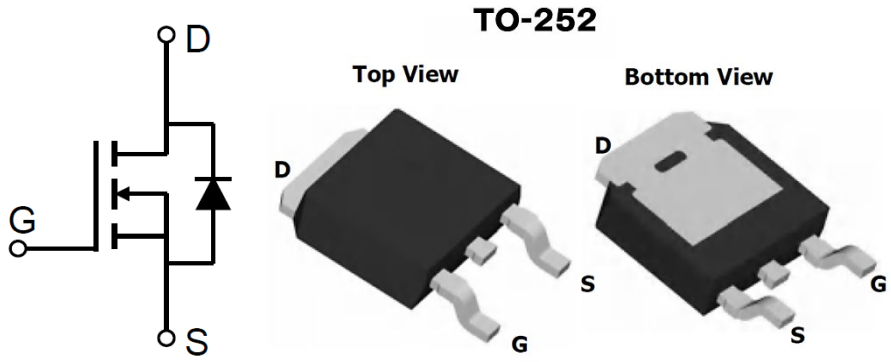
  $R_{DS(ON)}$ TYP= 2.2m Ω @ V_{GS} = 4.5V

  $R_{DS(ON)}$ TYP= 2.9m Ω @ V_{GS} = 2.5V
- Lead free and Green Device Available
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free

Applications

- Load Switch
- PWM Application
- Power Management

Pin Description



NO.	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE

Absolute Maximum Ratings

(@ T_C = 25℃ unless otherwise specified)

Symbol	Parameter		Value	Units
V_{DS}	Drain-to-Source Voltage		20	V
V_{GS}	Gate-to-Source Voltage		±12	V
I_D	Continuous Drain Current	T_C=25℃	90	A
		T_C=100℃	57	
I_{DM}	Pulsed Drain Current (1)		360	A
E_{AS}	Single Pulsed Avalanche Energy note2		156	mJ
P_D	Power Dissipation	T_C=25℃	54	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(2)		32	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case(3)		2.32	℃/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	℃

Electrical Characteristics

(T_J = 25℃ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D=250uA, V_{GS}=0V	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	-	-	1.0	uA
I_{GSS}	Gate-Body Leakage Current	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	0.6	0.9	1.3	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS}=4.5V, I_D=30A	-	2.2	3.6	mΩ
		V_{GS}=2.5V, I_D=20A	-	2.9	4.9	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz	-	3476	-	pF
C_{oss}	Output Capacitance		-	528	-	pF
C_{rss}	Reverse Transfer Capacitance		-	464	-	pF
Q_g	Total Gate Charge	V_{GS}=0~8V,V_{DS}=10V, I_D=30A	-	65	-	nC
Q_{gs}	Gate Source Charge		-	8	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	12	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DD}=10V I_D=30A, R_{GEN}=3Ω	-	8	-	ns
t_r	Turn-On Rise Time		-	19	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	73	-	ns
t_f	Turn-Off Fall Time		-	80	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	90	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	360	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 30A	-	-	1.2	V
trr	Reverse Recovery Time	I_F=20A,di/dt=100A/us	-	16	-	ns
Qrr	Reverse Recovery Charge		-	5.6	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. E_{AS} condition: Starting T_J=25℃, V_{DD}=10V, V_G=10V, R_G=25Ω, L=0.5mH, I_{AS}=25A .

3. $R_{\theta JA}$ is measured with the device mounted on a 1 $inch^2$ pad of 2oz copper FR4 PCB

4. Pulse Test: Pulse Width≤300us, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Output Characteristics

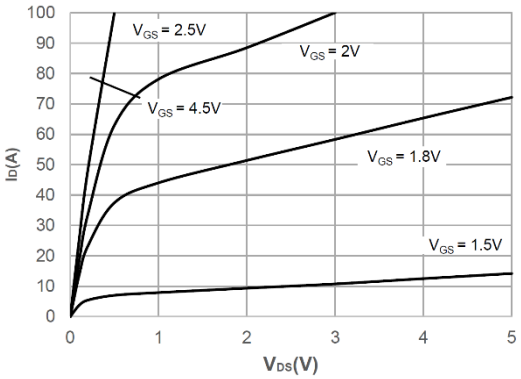


Figure 2: Typical Transfer Characteristics

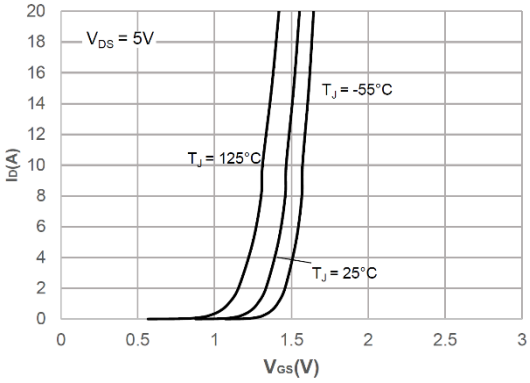


Figure 3: On-resistance vs. Drain Current

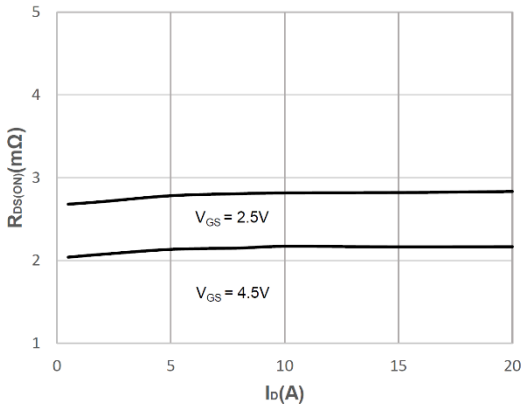


Figure 4: Body Diode Characteristics

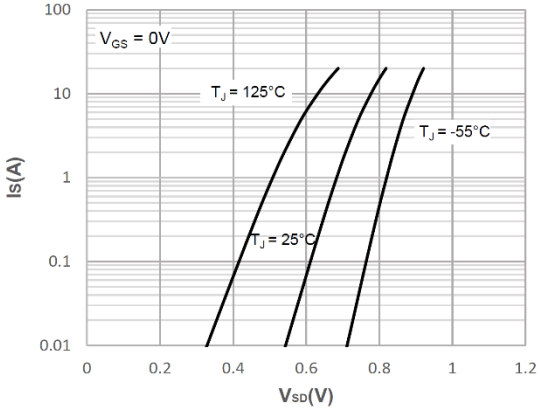


Figure 5: Gate Charge Characteristics

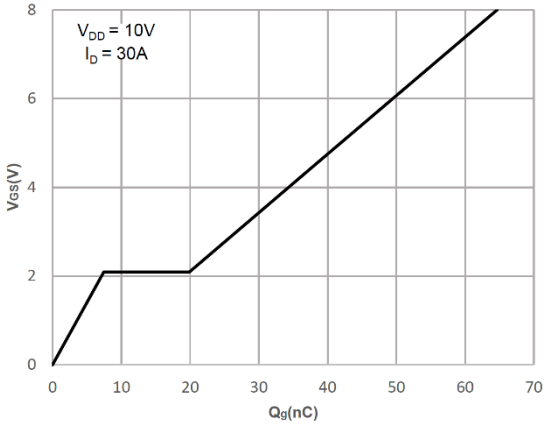


Figure 6: Capacitance Characteristics

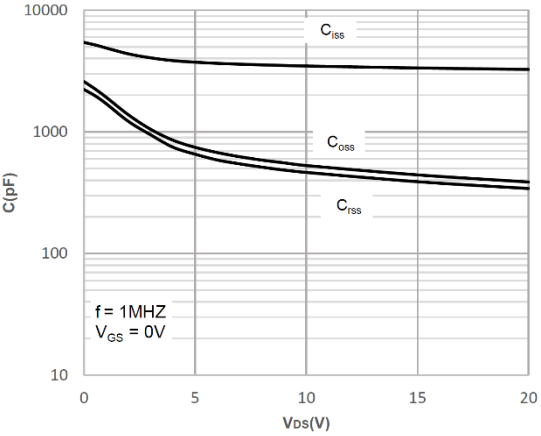


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

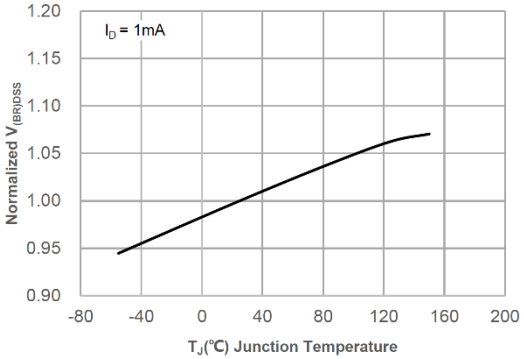


Figure 8: Normalized on Resistance vs. Junction Temperature

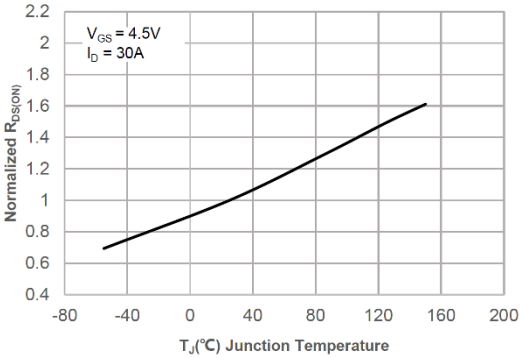


Figure 9: Maximum Safe Operating Area

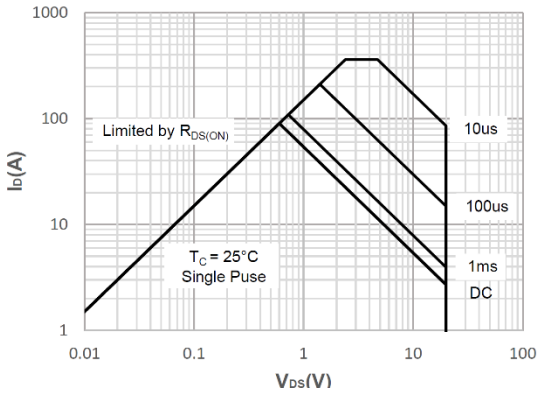


Figure 10: Maximum Continuous Drian Current
vs. Case Temperature

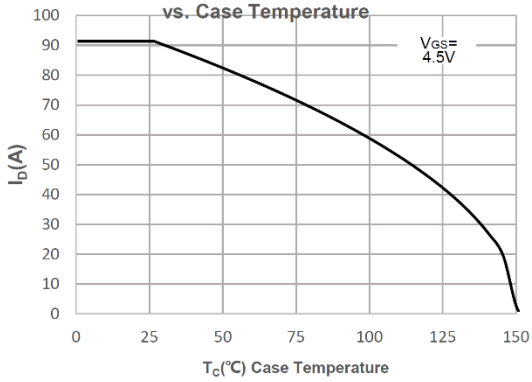


Figure 11: Normalized Maximum Transient Thermal Impedance

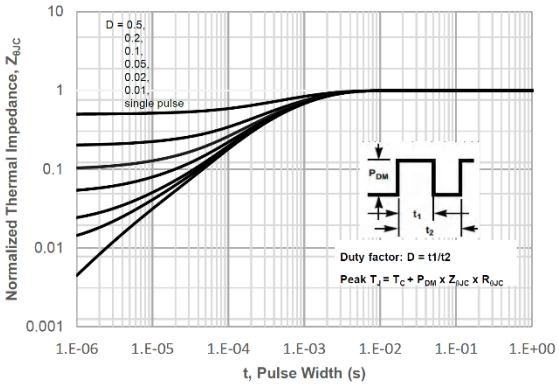
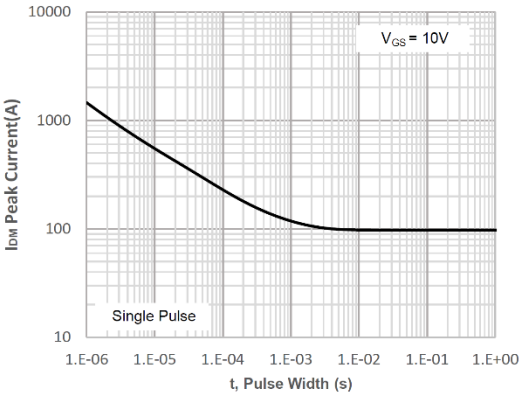


Figure 12: Peak Current Capacity



Test Circuit

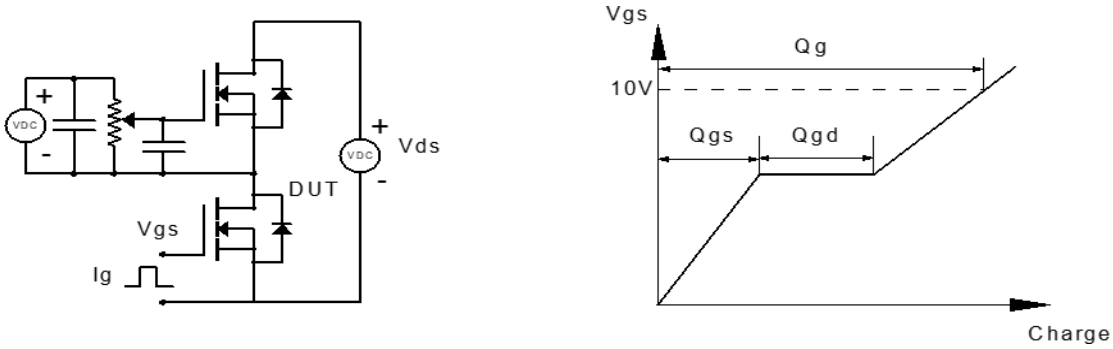


Figure 1: Gate Charge Test Circuit & Waveform

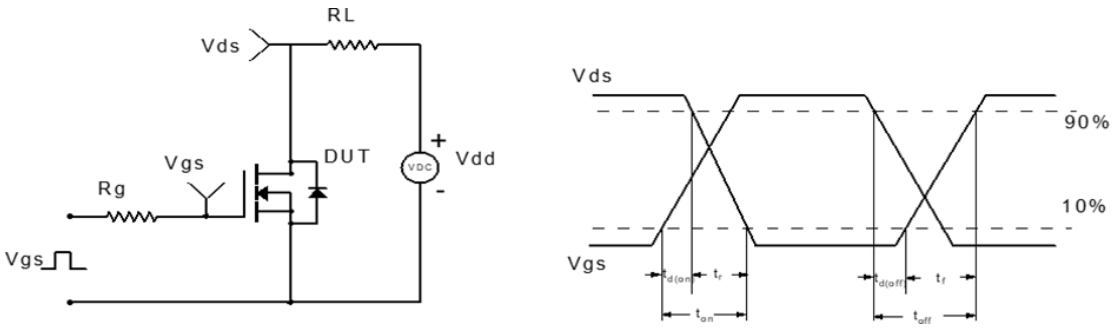


Figure 2: Resistive Switching Test Circuit & Waveform

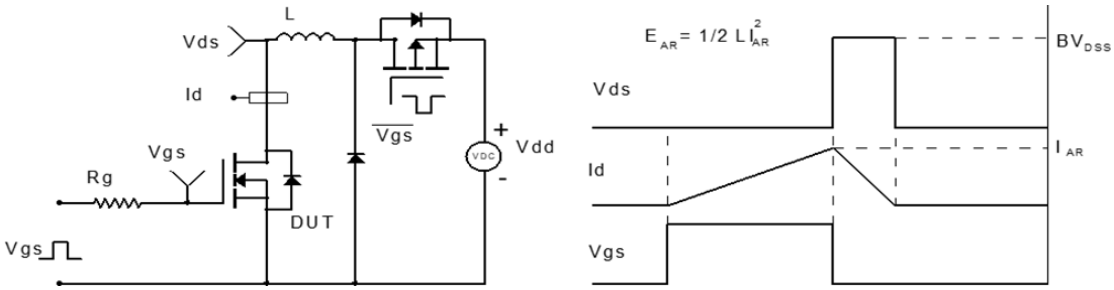


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

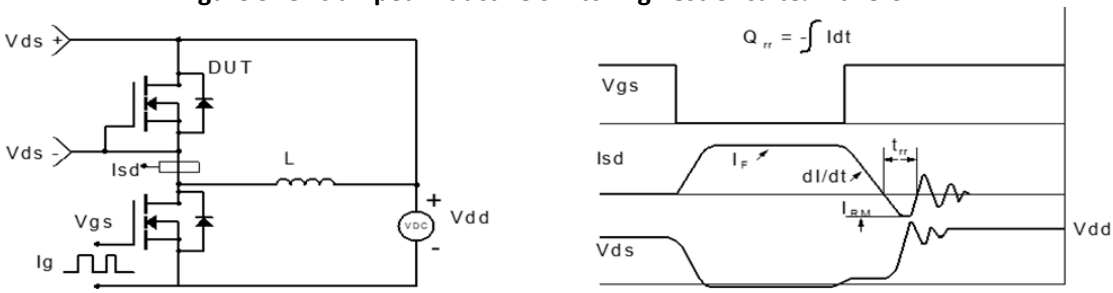
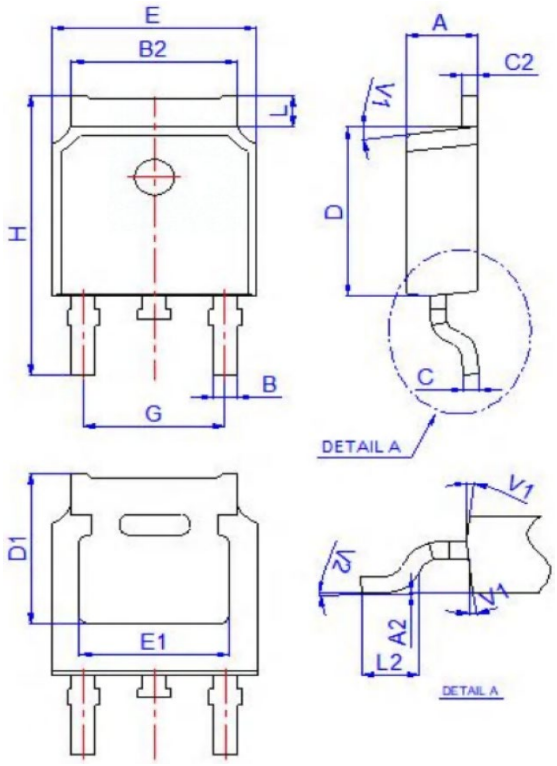


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(TO-252-3L)



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.10	2.50	0.083	0.098
A2	0	0.10	0	0.004
B	0.66	0.86	0.026	0.034
B2	5.18	5.48	0.202	0.216
C	0.40	0.60	0.016	0.024
C2	0.44	0.58	0.017	0.023
D	5.90	6.30	0.232	0.248
D1	5.30 REF		0.209 REF	
E	6.40	6.80	0.252	0.268
E1	4.63		0.182	
G	4.47	4.67	0.176	0.184
H	9.50	10.70	0.374	0.421
L	1.09	1.21	0.043	0.048
L2	1.35	1.65	0.053	0.065
V1	7°		7°	
V2	0°	6°	0°	6°

Ordering information

Order Code	Package	V_{DS}(V)	I_D(A)	$R_{DS(ON)}$(m Ω)	
QND120N02AJ	TO-252	20	90	V_{GS}=4.5V	2.2
				V_{GS}=2.5V	2.9